

REMARKS

Claims 44-83 have been cancelled. Claims 84 - 178 have been added. Support for the added claims is found in the specification as originally filed. No new matter has been added. The references will be discussed in reference to the new claims.

CLAIM 84

84. (new) A memory element, comprising:

a first dielectric layer;

a electrical contact formed on said first dielectric layer;

a second dielectric layer formed on said electrical contact, said electrical contact having an edge between said first and second dielectric layers; and

a programmable resistance material in electrical communication with said electrical contact, substantially all of said electrical communication occurring through at least a portion of said edge.

I. Gonzalez (US 6,194,746)

1. Gonzalez (Figure 19) fails to teach or suggest an electrical contact wherein substantially all electrical communication occurs through at least a portion of an edge of the contact.

2. Gonzales (Figure 19) also fails to teach or suggest "a second dielectric layer" formed on the electrical

contact as recited by applicant. In Figure 19, the conductive polysilicon layer 88 is formed in the hole 84. Hence, the conductive polysilicon layer 88 is formed on the dielectric (oxide) layer 82 and there is no second dielectric layer formed on the polysilicon layer 88.

II. Ovshinsky (U.S. 5,687,112)

In applicant's claimed invention, an electrical contact is formed on a first dielectric layer and a second dielectric layer is formed on the electrical contact. The electrical contact has an edge between the first and second dielectric layers.

This is distinct from the teachings of Ovshinsky '112. Referring to Figure 2 of Ovshinsky '112, both portions of dielectric layer 18 are formed on top of the conductive layer 18 (see Ovshinsky, column 15, lines 57-60).

Generally, "Layer A formed on Layer B" is distinct from "Layer B formed on Layer A". It implies a different order of applying the layers onto a substrate and a hence a different structure on the substrate.

HENCE, IN OVSHINSKY, THE ELECTRICAL CONTACT [34,14] IS NOT FORMED ON EITHER OF THE PORTIONS OF DIELECTRIC LAYER 18. IN CONTRAST, BOTH PORTIONS OF THE DIELECTRIC LAYER 18 ARE FORMED ON THE ELECTRIC CONTACT [34,14].

Ovshinsky '112 thus fails to teach applicant's invention as recited in claim 84.

III. Ovshinsky (US 5,414,271)

Ovshinsky fails to teach or suggest "substantially all of said electrical communication occurring through at least a portion of an edge of said contact". In contrast, referring to Figure 1, the electrical communication between the conductive layers [32,34] and the programmable resistance material 36 occurs through the entire upper surface of layer 34.

IV. Tanahashi (US 6,064,084)

1. Tanahashi fails to teach or suggest the use of the structure shown in Figure 2C in combination with programmable resistance materials. In fact Tanahashi teach away from such use. See column 3, lines 45-55 of Tanahashi where it states, in part:

...film 4 is formed with an opening 4 so as to expose the top edge of the conductive film 3,...

In the contact structure of FIG. 2C, it should be noted that the contact between the conductive film 3 and the electrode pattern 5 is limited to the circled region indicated in FIG. 2C. Thus, the contact structure of FIG. 2C inevitably suffers from the problem of increased contact resistance caused by the limited contact area." (Emphasis added).

Hence, (as noted on col 3, line 62-64) Tanahashi wishes to decrease contact resistance and teaches away from the use of the structure shown in Figure 2C.

CLAIM 131

1. (new) A memory element, comprising:

a first dielectric layer having a sidewall surface;
a conductive layer formed on said sidewall surface;
a second dielectric layer formed on said conductive layer, said conductive layer having an edge between said first and second dielectric layers;

and

a programmable resistance material in electrical communication with said conductive layer, substantially all of said electrical communication occurring through at least a portion of said edge.

Analysis of the References:

Same analysis as for claim 84 above.

CLAIM 150

150. (new) A memory element, comprising:
a programmable resistance material; and
an electrical contact in electrical communication with
said programmable resistance material, said electrical
contact formed on a sidewall surface of a dielectric layer,
said electrical contact extending on said sidewall surface
to an edge adjacent said programmable resistance material,
substantially all of said electrical communication
occurring through at least a portion of said edge of said
electrical contact.

I. Gonzalez (US 6,194,746)

Gonzalez (Figure 19) fails to teach or suggest an
electrical contact wherein substantially all electrical
communication occurs through at least a portion of an edge
of the contact.

II. Ovshinsky (U.S. 5,687,112)

Applicant's claim 150 recites in part:

"...said electrical contact formed on a sidewall surface of
a dielectric layer, said electrical contact extending on
said sidewall surface to an edge adjacent said programmable
resistance material..."

Ovshinsky fails to teach or suggest an electrical contact
formed on a sidewall surface of a dielectric layer where

the electrical contact extends on the sidewall surface to an edge adjacent to the programmable resistance material.

III. Ovshinsky (US 5,414,271)

Ovshinsky fails to teach or suggest "substantially all of said electrical communication occurring through at least a portion of an edge of said contact".

IV. Tanahashi (US 6,064,084)

Tanahashi fails to teach or suggest the use of the contact structure shown in Figure 2C in combination with programmable resistance materials. As discussed above Tanahashi teaches away from such use.

CLAIM 166

1. (new) A memory element, comprising:

 a programmable resistance material; and
 an electrical contact in electrical communication with said programmable resistance material, said electrical contact formed on a sidewall surface of a dielectric layer, said electrical contact extending on said sidewall surface to a terminal portion adjacent said memory material, said terminal portion having a thickness between 50 and 1000 Angstroms, substantially all of said electrical communication occurring through said terminal portion.

I. Gonzalez (US 6,194,746)

Gonzalez (Figure 19) fails to teach or suggest the size limitation "between 50 and 1000 Angstroms". It is noted that the hole 84 is made by "conventional masking and etching process" (see column 11, lines 35-37) thereby teaching that the diameter of the hole is greater than 1000 Angstroms.

II. Ovshinsky (U.S. 5,687,112)

Ovshinsky fails to teach or suggest an electrical contact formed on a sidewall surface of a dielectric layer where the electrical contact extends on the sidewall surface to a terminal portion adjacent to the programmable resistance material.

III. Ovshinsky (US 5,414,271)

Ovshinsky fails to teach or suggest the size limitation "between 50 and 1000 Angstroms".

IV. Tanahashi (US 6,064,084)

Tanahashi teaches away from the use of contact structures shown in Figure 2C. As noted in column 3, lines 62-65, an object of the invention is to reduce contact resistance and hence increase the size of the contact area.

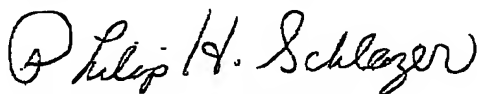
In view of applicant's cancellation of claims 44-83, the claim rejections under 35 USC 102 (paragraphs 3, 4 and 6 of Office Action), and 35 USC 103 (paragraph 7) have been overcome and applicant's request they be removed.

In view of the above remarks, each of the references provided (Gonzalez '102, Ovshinsky '112, Ovshinsky '271, and Tanshashi '084), either alone or in combination, fails to teach or suggest applicants invention as recited in the new independent claims 84, 131, 150 and 166. All remaining dependent claims include all of the limitations of their respective independent claim. Hence, the references provided fails to teach or suggest all of the limitations of any of the dependent claims.

SUMMARY

In view of the above remarks, new claims 84 - 178 are in condition for allowance. Applicant respectfully requests reconsideration, withdrawal of the outstanding rejections, and notifications of allowance. Should the Examiner have any questions or suggestions regarding the prosecution of this application, he is asked to contact applicant's representative at the telephone number listed below.

Respectfully submitted,



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